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ABSTRACT

This interdisciplinary course is designed for senior year high school students in social studies and/or science. Its main thrust is the investigation of human values as they relate to the environment, although rooted in the natural sciences as a means of understanding the complexities inherent in the environment. Use is made of the case study approach to environmental issues (controversial questions) together with participatory research in the community. Multi-text, small group instruction, individual projects, and simulation techniques are also incorporated to develop an understanding and a corresponding value and behavior change in the inter-relationship of man to his biophysical and sociocultural environment. The course is subdivided into seven sections: (1) An Introduction to Crises; (2) Ecology; (3) The Nature of Man; (4) Science-Technology; (5) Concerns Caused by Science-Technology; (6) Population; and (7) The Role of the Scientist, Citizen, Industrialist, and Administrator in Ecology. Each unit indicates the subtopics to be covered, objectives, generalizations, methodology, culminating activities, evaluation, resources, and supplementary information where appropriate. (Author/BL)

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ECOLOGY AND HUMAN VALUES

WISCONSIN DEPARTMENT OF PUBLIC INSTRUCTION
William C. Kahl, State Superintendent

SE 027 838

ECOLOGY AND HUMAN VALUES

A Course of Study

(Working Draft)

State Social Studies Curriculum Study Committee

WISCONSIN DEPARTMENT OF PUBLIC INSTRUCTION
WILLIAM C. KAHL, STATE SUPERINTENDENT

Bulletin No. 3171

PREFACE

Included in the one semester high school course are activities for each unit as well as unit objectives. Required and suggested readings are also included in the course in order to help instructors and students better understand their positions on controversial issues.

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ECOLOGY AND HUMAN VALUES

Introduction

As he introduced the Environmental Quality Education Act in Congress Senator Gaylord Nelson made the following statement:

> Education, I believe, is the only proper way to influence values, attitudes and basic assumptions in a democratic society. Behavior in the long run, can best be changed through the process of education.

The assumption made by Senator Nelson is that emphasis on environmental education, like the emphasis on science and math education after Sputnik I in 1957, will have a positive impact on our environment in much the same way that the National Defense Education Act has upon the critical subject areas. However, if environmental education is to be something of value, educators must come to grips with the central issue which Senator Nelson refers to--value and attitude change. We must ask:

- What changes in values (behavior) are needed?
- Who will determine the direction of the value changes?
- Can schools effect fundamental value changes without concomitant changes in the larger community?

These questions should not stymie our efforts to deal with the problems of the environment. Indeed, social studies educators should welcome the challenge of working with students in already familiar areas--value analysis and controversial issues. If, as Senator Nelson suggests, our behavior toward our environment is based on unexamined values and faulty assumptions, then it should be the business of education, and particularly social studies education, to examine these values and challenge the assumptions. Teaching the process of value analysis may seem a large order, but the analysis of values is related to any controversial topic. As a matter of fact, we can define controversial issues as those questions which rest upon conflicting belief systems. Further, since conflicting belief systems or moral dilemmas abound in all areas of human existence, it is indefensible to suggest that the teacher of social studies avoid the area of controversy (including environmental issues).

A rationale for the inclusion of environmental problems (controversial questions) in the social studies curriculum must be couched in terms of value clarification. This, it seems, is exactly what Senator Nelson suggested in his presentation to the Senate. Social conflict (controversial issues) has been categorized in many different ways. For example, Hunt and Metcalf argue that human conflict is of two types: intrapersonal and interpersonal. They suggest that intrapersonal conflict in individuals mainfests itself in uncertainty as to what to believe or value. Individuals who are inconsistent or uncertain cannot engage in morally responsible

behavior based upon intellectual understanding and personal commitment. Hunt and Metcalf argue that this uncertainty, this inconsistency, this inability to establish a commitment to anything is in large part due to the school's failure to deal with "closed areas" or controversial issues (certain areas of conflicting belief, i.e., social class, race relations, environmental problems, etc.). Raths, Harmin and Simon also suggest that the failure to clarify value positions can mean a continued existence of apathy, uncertainty, inconsistency and uninvolvement. Kenneth Keniston further claims that the "now" generation's attribute of uncomittedness is due mainly to their inability to clarify their values and commit themselves to them.

Thus, environmental issues (controversial questions) are an important and necessary area of study in the social studies if value-belief systems are to be examined; and the analysis of value-belief systems is necessary if individual commitment toward the solution of environmental problems is to be achieved.

Without doubt, the handling of controversial issues can be one of the most difficult, and at the same time most important activities that a social studies class can engage in. The difficulty of handling issues in the classroom stems from the fact that three basic problems must be clarified before issue resolution can be achieved:

1. the problem of identifying and clarifying values which are in conflict and choosing among them (in public controversy, laws may also be in conflict);

2. the problem of clarifying the facts in the issue; and

3. the problem of clarifying the definitions of words used in the controversy.

In presenting issue controversy in the classroom, one of the best teaching strategies is the case study approach. Through the case study, students can gain experiences in dealing with value problems, definitional problems and factual problems which can help them develop what Don Oliver calls "principles of analysis".

Putting the controversial situation in a case study gives a sense of reality to the issue, and, more important, allows the student to discover (internalize) "principles of analysis" through practice.

In considering issues on environmental problems, the social studies teacher might look at the following*:

*In dealing with the suggested issues here, as with any controversial issues, it is suggested that the conceptual framework of value problems, factual problems and definitional problems be applied. For example, in any of the issues studied, questions can be raised relative to the nature of the values that are in conflict, the facts involved in the issue and the definitions of words used in describing the issue or controversy.

1. It is believed that an annual economic (Gross National Product) growth rate of between three and four percent is necessary if the United States economy is to escape a depression; it is also believed that if the quantity of production is maintained or increases we will be faced with an irreversible environmental crisis.

2. It is believed that only the individual citizen can effectively control pollution; but it is also believed that we live in a highly organized society, a society of corporations and institutions where the individual is quite helpless.

3. It is believed that the government should trim spending; but it is also believed that large sums of money from the federal government will be necessary if pollution is to be controlled.

4. It is believed that population (too many people) and the processes used in trying to meet the needs of people is the major cause of pollution; but it is believed also that an increasing population means an increasing market which is important to the growth of any economy.

5. It is believed that the American society is one of the most mobile societies in the world, and this mobility is necessary in providing economic opportunities for our citizens; but it is also believed that the American preoccupation with movement has interfered with our ability to develop more stable families, communities and institutions.

The above list of issues is suggested as a point of entry into the study of environmental problems which, above all, is the study of alternative actions based on a careful analysis of the facts and the values present in the issue.

"Ecology and Human Values" is a program designed for high school students in social studies and/or science. Its main thrust is the investigation of human values as they relate to the environment. But it is also a program that is rooted in the natural sciences and draws heavily upon natural science as a means for understanding the complexities inherent in said environment. Much use is made of the case study approach as well as participatory research in the community. Above all this program attempts to encourage students to make judgments about their environment relative to its beauty and ugliness; and further, to allow students to make suggestions relative to how they would go about creating a better quality environment for all citizens.

Getting Started

In developing an interdisciplinary course such as "Ecology and Human Values" several factors must be considered. Obviously, a need must be felt. There must be a sincere belief by the teachers involved that the

material and methodology being developed is of utmost importance for present and future generations.

Once this concern is felt, cooperation in the form of encouragement and time and money must be sought from the administrators and the boards of education of the school districts. Time must be available if proper analysis and creativity is to come forth.

If the teachers involved in developing a course in environment and values do not feel fully qualified, the first step to take is further formal education, either through extension classes or summer school. This additional education would enhance the knowledge and skills necessary in developing such a course.

At this stage, the staff can select the subject areas to be included. When this has been done, specific objectives, as well as generalizations for each area, should be developed. When teachers from different subject areas, such as science and social studies (in this particular instance) work together in developing objectives, there will be times when disagreement will arise. This is a healthy situation. Through discussion and analysis of the disagreements, better objectives will be developed.

The next step is to collect and analyze information pertinent to each unit. This would include information dealing with natural and social science as well as information dealing with values.

When the information is selected, the next step is deciding what methodologies will provide a correlation between the physical and social sciences and values, as well as affording the student the opportunity to use various techniques in the learning process.

In a values course, it is important that students be given several alternative processes from which to choose.

With the methodology selected, the staff must then decide what resources should be made available for methodology to be implemented and to make possible the attainment of the stated objectives.

The teachers involved must be careful to select materials that reflect alternative values rather than the biases of the instructors.

Because of the controversial nature of the issues that must be confronted, it is imperative that the community, the school board and the administration be aware of the issues being confronted and how they will be handled.

Once the course is implemented, constant planning and coordination, as well as evaluation, must occur among the staff members if an optimum learning environment is to be maintained.

One of the significant phenomenon of our times is the public's increasing awareness of the many problems which have arisen from the impact of science-technology on society. One characteristic of science-technology generated problems such as the population explosion, destruction of the environment, the bomb, potential genetic engineering, urban chaos, the anomaly and placelessness of modern man and so on, is that to be adequately understood they must be examined on an interdisciplinary basis. Causes for these problems must draw upon material that is biological, sociological, political, and humanistic.

If science-technology has produced some undesirable as well as desirable effects in the natural environment of man, these undesirable effects must first be recognized and then change must take place. Change, at least to the extent that some sort of balance is established between benefit and risk in the short run and long run.

Change in the behavior of man towards nature comes primarily when a change in values occurs. The relationship between knowledge, values and change will be the constant theme running through the course.

Course Make-Up

The course, "Ecology and Human Values", will be an interdisciplinary course taught cooperatively by teachers from the biology and social science departments. The course will be an elective for one semester during a student's senior year of high school. The seminar approach will be the chief method of instruction. Science-technological forces in our environment will be analyzed as to the impact on nature as well as to the impact on the value system of human beings. A variety of instructional methods will be used. Multi-text, small group instruction, individual projects and simulation techniques will all be incorporated to develop an understanding and a corresponding value change and performance in the interrelationship of man to his biophysical and sociocultural environment.

Generalizations

A. Education exists to change the behavior of the learner.

B. In order to change the behavior of man, attitudes and values must be changed beforehand.

C. Values depend on knowledge.

D. One must always consider the opportunity costs involved in all choices of behavior contemplated.

E. At times, costs (economic, social, or moral) are not foreseeable at the time of decision.

F. Wants and desires of people and institutions have an influence on the decision making process.

G. The environment of man is a combination of nature and man-made institutions which interact to determine the quality of life now and in the distant future.

H. Because of different human values and priorities, conflict will at times arise between different values systems as to which choices should be made.

I. Through an enlightened public, choices can better be made in an objective and intelligent manner.

Overall Course Objectives

Each student should develop:

-- An ecological awareness--a concern for their total environment.

-- An economic awareness--a feeling for how costs relate to today's ecological problems.

-- A political awareness--an understanding of an individual's role as it relates to collective responsibility.

-- A social awareness--a recognition of the effect of one's own self-image and values on individual behavior as well as some grounding in the dynamics of communication between men and groups.

-- A problem analysis awareness--the ability to define resource problems, bringing to bear all facets of the situation and all points of view relating to it.

-- A realization that man is a part of, not apart from, Nature.

Course Outline

I. An Introduction to Crises

II. Ecology

III. The Nature of Man

IV. Science-Technology

V. Concerns Caused by Science-Technology

VI. Population

VII. The Role of the Scientist, Citizen, Industrialist and Administrator in Ecology

WHERE DO YOU STAND?*

Directions: Please answer the first thirteen questions by placing in the blank to the left of the question the number that describes your attitude as follows:

(1) Strongly agree
(2) Agree
(3) Uncertain
(4) Disagree
(5) Strongly disagree

_____ 1. I believe that plants and animals exist primarily for man's use and enjoyment.

_____ 2. With advances in technology, I think that man will always be able to draw the resources he needs from the environment.

_____ 3. I think that pollution and racism are both part of the same basic problems in our society.

_____ 4. I do not think that I am personally responsible for our present state of pollution.

_____ 5. I am afraid that industrial and military plans to exploit the ocean's resources may seriously endanger human life on this planet.

_____ 6. I think that owners of private property should be free to use the plants and other natural resources on it pretty much as is now permitted by law and convention.

_____ 7. I believe that the profit motive in our society (desire for individual economic gain) is now outdated and must change.

_____ 8. I feel that our environmental problems probably cannot be solved by existing American political and economic institutions.

_____ 9. I think that all American families, regardless of social or economic position, must limit the number of children to two, or three at most.

_____10. I believe that our ecological crisis can be solved primarily by application of technology.

_____11. I feel that American beliefs and values have been a basic cause of our present environmental problems.

_____12. I believe that economic growth is nearly always good for any community.

_____13. I think that population control should be encouraged by removing tax exemptions for more than two children.

*Pages 7-10 can be used for pre- and/or post-tests for the course.

Please complete the rest of the questions by placing in the blank to the left of the question the number of the statement that best describes your opinion.

_____14. Do you feel that wild animals have any rights?
(1) Yes, equal to man's
(2) Yes, but subordinate to man's
(3) Undecided
(4) No

_____15. Have you ever been in a wilderness area beyond all roads and human habitation?
(1) Yes
(2) Uncertain
(3) No

_____16. If so, do you feel yourself to be different when you are in a wilderness area than when you are in a more man-made environment?
(1) Yes
(2) Undecided
(3) No

_____17. How do you see yourself in relation to the influential and powerful groups in your community?
(1) I am part of them and have a voice in decision making.
(2) I feel part of them even though I do not make decisions.
(3) I am part of them but dislike it.
(4) I am outside of them but not opposed to them.
(5) I am outside of them and dislike them.
(6) I am outside of them and actively oppose them.

_____18. How do you feel about the movement within the churches to increase active involvement in social problems?
(1) Strongly agree
(2) Agree
(3) Uncertain
(4) Disagree
(5) Strongly disagree
(6) I do not know enough about it to answer.

_____19. How do you feel about the peace movement (anti-Viet Nam war)?
(1) I support it and am active in it.
(2) I favor it generally but have not been active in it.
(3) I am uncertain how I feel.
(4) I agree with its goals but disapprove of its methods.
(5) I disapprove of the movement but am against repressive action.
(6) I disapprove and would like to see the movements suppressed.

_____20. How do you feel about the student movements in colleges?
(1) I support them and am active in them.
(2) I favor them generally but have not been active.
(3) I am uncertain how I feel about them.
(4) I agree with their goals but disapprove of their methods.
(5) I disapprove of the movements but am against repressive action.
(6) I disapprove and would like to see the movements suppressed.

_____21. How do you feel about the Black Power movement?
(1) I support it and am active in it.
(2) I favor it generally but have not been active.
(3) I am uncertain how I feel.
(4) I agree with the goals but disapprove of the methods.
(5) I disapprove of the movement but am against repressive action.
(6) I disapprove and would like to see the movement suppressed.

_____22. How do you feel about the conservation and ecology movements?
(1) I support them and am active in them.
(2) I favor them generally but have not been active.
(3) I am uncertain how I feel.
(4) I agree with the goals but disapprove of some of the methods.
(5) I disapprove of the movements but am against repressive action.
(6) I disapprove and would like to see the movements suppressed.

_____23. Do you think that there is any connection between all of these various movements in our society?
(1) They are all aspects of one single wave of revolutionary change.
(2) They may be related but are still separate movements.
(3) I am uncertain what I think.

_____24. Write in the space provided the numbers of any of these methods of influencing decision-makers that you would approve of:
(1) Writing letters to government officials.
(2) Speaking at public hearings.
(3) Lawsuits against corporations, government agencies, or individuals guilty of environmental negligence.
(4) Boycotts against companies that pollute.
(5) Rallies, marches, demonstrations.
(6) Nonviolent direct action such as sitting in front of bulldozers.
(7) Citizen take-overs of offices of government agencies or industries to enforce demands.
(8) Destructive (violent) action, if other means failed (such as sabotage or bombings).

SOURCE: Natural History Magazine, Luther P. Gerlach and Virginia Hine.

VALUE CLARIFICATION EXERCISE

Which of the following environmentally recommended actions are you willing to carry out in your household both now and in the future? (Assume that lack of money is not a limiting factor.) Be frank and honest. After you complete this exercise, the class will discuss and delineate the variables affecting your responses.

1. Wear mended or patched clothes to school, church, and social occasions.

   Yes_____ Some occasions_____ No_____ Undecided_____

2. Hang clothes on a clothesline to dry rather than buy and use a dryer.

   Yes_____ No_____ Undecided_____

3. Refrain from buying a dishwasher.

   Yes_____ No_____ Undecided_____

4. Limit annual family recreation mileage in an automobile to 5,000 miles per year.

   Yes_____ Yes, but with larger figure_____ No_____ Undecided_____

5. Refrain from buying a boat or cottage.

   Yes_____ No_____ Undecided_____

6. Live in adequately-sized older home in workingman's neighborhood. (In other words, refrain from buying a home for status.)

   Yes_____ No_____ Undecided_____

7. Cut water consumption in the household to an annual average of 8 gallons per person per day.

   Yes_____ Yes, but with larger figure_____ No_____ Undecided_____

8. Refrain from using pesticides or insecticides.

   Yes_____ Limited Use_____ No_____

9. Mow the lawn with a push mower rather than one which is power driven.

   Yes_____ No_____ Undecided_____

10. Purchase the smallest, least ornate car which will serve the transportation needs of the family. (In other words, refrain from buying a car for status.)

    Yes_____ No_____ Undecided_____

COURSE OUTLINE

I. In Introduction to Crises

A. Environmental Threats to Man

1. Pesticides
2. Oil
3. Radiation
4. Chemicals
5. Drugs
6. Depletion of natural resources
7. Landscape degradation

B. Pollution

1. Air
2. Water
3. Solid waste
4. Thermal
5. Noise
6. Aesthetic

C. Over-population
1. Numbers of people
2. Food production
3. Limits of earth

D. Human Values

1. Social
2. Political
3. Economic

E. "A life not worth questioning is not worth living"

Objectives:

A. Student becomes aware of the elements influencing environment.

B. Student senses the urgency of environmental problems.

C. Student develops an overview of environmental crisis and values related to the crisis.

D. Student develops an awareness of and becomes tolerant of values that conflict with his own.

Methodology:

A. Write a paper titled "Environmental Crisis: Something Real, a Cop-Out or a Passing Fad?"

B. After studying the results of your attitudinal questionnaire (p. 7-9), analyze your position. Place yourself on a continuum which will be provided by your instructors.

C. Read and be ready to discuss the handout, "A Fable for Tomorrow."

D. Write a paper showing what you think is the most pressing ecological problem today and why.

E. Read: "Fighting to Save Earth from Man," Time, Feb. 2, 1970.

F. In small groups, discuss issues involved in the questionnaire on the following page ("What Do You Think?").

G. Rank in order according to your own preferences:
   1. beauty, health, intelligence
   2. Canada, jail, Viet Nam
   3. clean environment, good salary for job, free enterprise

H. In groups of two, make up one or two slogans dealing with ecology and/or values for bumper stickers. Be sure to keep them short and to the point. Try to make them clever enough to gain attention and simple enough to be immediately understood. These will be presented to the class for discussion. (NOTE: Slogans should be three to six words.)

I. Participate in simulation game, "Ethics", in small groups.

J. Read p. 6-11, 14-18 in No Deposit, No Return.

K. Discuss the following questions in small grups. Each group should be prepared to discuss its conclusions with the class.

   1. Will the mass media lose interest in pollution when the problem is no longer a novelty?
   2. Are the consequences of doing little or nothing to clean up the environment exaggerated?
   3. Is the concern about the environment being used by the Administration and special interest groups as a distraction from more important problems?
   4. Is our society mature enough to sustain a long-range attack against the problems of the environment?
   5. Are Americans capable of directing their attention to more than one big social problem at a time?
   6. Can the nation afford to work toward the solution of several urgent social problems simultaneously?
   7. How are national priorities determined?

L. Discuss the following questions dealing with the "Ecology Movement":

   1. Why has anti-pollution become a popular cause?
   2. Do the problems of the environment affect all Americans equally?
   3. Is the anti-pollution movement made up primarily of middle-class whites?
   4. Do students view the fight against pollution as another way of attacking the establishment?

5. Is the ecology movement attracting primarily the same students who want peace now in Viet Nam?
6. Is the concern about the environment part of a political conspiracy?
7. Does the desire to save our environment cut across political lines?
8. Will saving the environment require the formation of a third political party?
9. Does the fight against pollution offer a way of drawing nations together?

What Do You Think?

The fourteen statements below touch on various aspects of social life. Simply check whether you agree to disagree with each statement. This is not a test so there is no reason to record your name. The questionnaire will be collected so you will want to keep a record of your response to each item.

	Agree	Disagree
1. Parents should have the sole right to decide the number of children they will have.	_____	_____
2. To protect consumers from exploitation, prices should be examined and regulated by government.	_____	_____
3. Important government decisions should be made only after consideration by many informed groups.	_____	_____
4. Efforts should be made to reduce poverty in the United States.	_____	_____
5. Population growth should be regulated.	_____	_____
6. The rate of social change is so great it frightens me.	_____	_____
7. Education should be concerned with developing the uniqueness of individuals.	_____	_____
8. Residents in a neighborhood should have the right to determine who shall live there.	_____	_____
9. The churches in the U.S. have been too slow to join the struggle against social injustice.	_____	_____
10. Students' rights to equal educational opportunities should be guaranteed throughout the U.S.	_____	_____
11. People should work for any income they receive.	_____	_____

	Agree	Disagree
12. Business firms should have the right to sell their products for whatever the market will bring.	____	_____
13. Each community should have the right to run its own schools.	____	_____
14. Our society is going to be torn apart by rising tension and unrest.	____	_____

Film:

A. What Are We Doing to Our World? (McGraw-Hill)--examination of way technology is altering our environment.

Filmstrip:

A. Crisis of the Environment, (New York Times Book and Educational Division.

II. Ecology

A. Definition

B. Significance

C. Web of Life

D. Releaser-Action

1. Food webs
2. Biochemical cycles
3. Energy flow-pyramids of energy, mass, nos.

E. Communities and Ecosystems

1. Human vs. natural ecosystems
2. Interspecies relationships
3. Succession
4. Niches

F. What is Nature

1. Western view
2. Eastern view

G. Purpose of Environment

1. Christian-Judeo view toward nature
2. Genesis 1:28-30, its interpretation
3. Contemporary values of man
   a. Is there really a necessity to be so concerned with environment?
   b. "To live is to pollute"
   c. "Doomsday" view vs. "New Religion" view
4. Spaceship Earth philosophy

H. Commoner's Three Laws of Ecology

1. Everything is connected with everything else.
2. Everything goes somewhere.
3. There is no such thing as a free lunch.
   a. Every benefit that is introduced to improve happiness, our welfare or our security has a cost factor some place.
   b. Measure benefits against risks.

Objectives:

A. Student comprehends the ecosystems.

B. Student compares and constrasts the effect of divergent views on the role of natural environment and man.

C. Student appreciates the natural environment and recognizes the particular contribution made by the elements of nature.

D. Student recognizes the complexity of nature and the ramifications of innovations.

E. Student learns to function better within his environment as a living organism.

Generalizations:

A. Living things are interdependent with one another and their environment.

B. Man has been a factor affecting plant and animal succession and environmental processes.

C. Modern man affects the structure of his environment.

D. Natural resources are interdependent and the use or misuse of one will affect others.

E. An organism is the product of its heredity and environment.

F. Man is influenced by many of the same hereditary and environmental factors that affect other organisms and their populations.

C. The rate of change in an environment may exceed the rate of organism adaptation.

H. All living things, including man, are continually evolving.

I. Succession is the gradual and continuous replacement of one kind of plant or animal complex by another and is characterized by gradual changes in species composition.

J. Social institutions influence the value positions of individuals.

Methodology:

A. Read Genesis 1:28-30, write a paragraph on what it means to you. Be ready to discuss your interpretation in class.

B. Have a panel discussion on the merits and demerits of the Naked Ape, by Desmond Morris.

C. Read and write a critical review of "The Good Earth and the Golden Rule", National Parks, January, 1970.

D. Read the following references:
1. "Historical Roots of Ecological Crisis" (handout)
2. No Deposit, No Return, p. 18-34, 273-275.
3. Reason Awake, p. 173-182.
4. So Human an Animal, p. 227-242.

E. Discuss the following questions in small groups:
1. Is the idea of a balance between man and nature a myth or not?
2. Has our civilization upset cycles and forces in nature necessary for survival?
3. When people speak of clean air, water, and land, are they talking about what is essential for health or pleasant for living?
4. Is "ecology" improperly used by many people to mean the good life?
5. Would we have more respect for human beings if we had more respect for nature?
6. Does the solution to environmental problems require the non-specialist as much as it does the scientist and engineer?

Evaluation:

A. Class discussion

B. Test based on readings and discussions

Resources:

Filmstrips--1. Ecology and Survival; 2. Science and Technology
Film--The World Around Us, NBC (Introduction to the science of ecology and its importance in today's world).
Tape--Survival

4 attack submarines ($45 million each)	Would Pay for	1 year of agriculture aid ($178.5 million)
1 atomic sub - missiles	"	$132 million in famine relief aid (includes freight)
1 atomic sub + missiles	"	$150 million in technical aid
1 $275 million aircraft carrier	"	35 school buildings at $4 million each
1 $250 million 108 Missile Base	"	1 1,743,000 KWH capacity H.E. dam
14 jet bombers at a cost of $8 million each	"	A school lunch program serving 14 million children
1 new prototype bomber fully equipped	"	250,000 teacher salaries this year; 30 science faculties with 1,000 students; 75 (100 bed) hospitals fully equipped; 50,000 tractors--15,000 harvesters.

What it costs to run the Pentagon for 2 1/2 hours = current annual expenditures on pollution control research

2 B-52 bombing runs in Viet Nam = annual expenditures on population research

Be fruitful, and multiply, and replenish the earth, and subdue it; and have dominion over the fish of the sea, and over the fowl of the air, and over every living thing that moveth upon the earth. And God said, behold, I have given you every herb bearing seed, which is upon the face of all the earth, and every tree, in which is the fruit of a tree yielding seed; to you it shall be for meat. And to every beast of the earth and to every fowl of the air, and to everything that creepeth upon the earth, wherein there is life, I have given every green herb for meat: and it was.

Genesis 1:28-30

If the last 50,000 years of man's existence were divided into lifetimes of approximately sixty-two years each, there have been about 800 such lifetimes. Of these 800, fully 650 were spent in caves. Only during the last seventy lifetimes has it been possible to communicate effectively from one lifetime to another--as weriting made it possible to do. Only during the last six lifetimes did masses of men ever see a printed word. Only during the last four has it been possible to measure time with any precision. Only in the last two has anyone anywhere used an electric motor. And the overwhelming majority of all the material goods we use in daily life today, have been developed within the present, the 800th lifetime.

From Future Shock

III. Nature of Man

A. Distinctive Characteristics of Man

1. Structural-physiological-behavioral
2. Ability to change the environment
3. Reaction to external forces
4. Abstraction--creativity
5. Cultural traits
6. Inherent characteristics

B. What Does "Human" Mean?

C. When Does One Become Human?

D. What Is So Virtuous About Being Human?

E. Is Life Important? If So, Why?

1. "Happiness index"--possible?

F. Life for Whom, the Butterfly or Humans?

G. If Life for Humans Is Most Important, All Humans or Certain Humans?

1. Area of eugenics
2. What determines the value of a human?
3. What determines the value of other living organisms?

H. How Long a Life?

1. Should humans strive to prolong their lives?
2. Would you like to live forever?

I. Three Theories on Life

1. Biological-clock theory
2. Cumulative-poison theory
3. The loss of control theory

J. Does Man Have a Right to Control Nature Even at the Expense of Other Living Organisms?

1. "Shade of an elm tree or the song of a robin."

K. What Is Meant by the "Quality of Life" or "Life Styles"

1. Is there one life style superior to another?
2. What factors determine one's view toward the quality of life?

Objectives:

A. Student recognizes the features of man that separate him from other living organisms.

B. The student can research the various views towards the meaning of being human.

C. The student, through knowledge of the nature of man, can develop attitudes and values about life for humans in the realm of length of life, types of life, and quality of life.

D. Based on his understanding of the nature of man, student develops a set of values based on concern for the well-being of all humans living now as well as a respect for providing opportunities for those not yet born.

Generalizations:

A. The management of natural resources to meet the needs of successive generations demands long-range planning.

B. A knowledge of social, physical, and humanities are important for environmental understanding.

C. Options available to future generations must not be foreclosed.

D. Natural resources affect and are affected by the material welfare of a culture and directly or indirectly by philosophy, religion, government, and the arts.

E. The form of life present depends upon the coincidence of the life needs and their availability in an environment.

F. Succession is the gradual and continuous replacement of one kind of plant or animal complex by another and is characterized by gradual changes in species composition.

G. Wildlife populations are important economically, aesthetically, and biologically.

H. Wildlife is considered to be a public resource.

I. Man has a responsibility to develop an appreciation of and respect for the rights of others.

J. Human resources include the physical and mental abilities with which man is endowed and the knowledge he has generated.

K. An individual must develop his ability to perceive if he is to increase his awareness and develop environmental perspective.

L. Individuals perceive different self-roles depending upon their position in the social and environmental context.

M. Man is the highest animal form because of his ability to reason.

Methodology:

A. Write a short paper on what you feel is most important in man in determining if he is "human".

B. Pick five aspects of what you feel is the "good life" and list the social cost involved in each aspect picked.

C. Ask a clergyman his interpretation of Genesis 1:28-30 and if he feels man has an inherent right to exploit other living organisms. Be prepared to react in class to the rationale the clergyman gives you.

D. Panel discussion on the advantages of being a human being rather than a horse.

E. Read the following and be ready to discuss:

1. Man's Way - Chapters 1 and 2.
2. So Human An Animal - Chapter 3.

F. Read "Struggle To Be An Individual" (Life reprint) and write out answers to questions.

Culminating Activities:

A. Bring to class a list of ten living organisms which come closest to being human, rank them one through ten with number one being closest, etc.

B. Debate: "War is a biological characteristic of man."

Evaluation:

A. Class Discussion

B. Evaluation of papers assigned

C. Evaluation of performance in panel and debate

D. Essay examination on a case study in which humanistic qualities must be identified

Suggested Readings:

A. The Territorial Imperative, Robert Ardrey

B. The Human Zoo, Desmond Morris

C. "Origin of Man," C. Loving Brace (Natural History, Jan. 1970)

D. Prevalence of People, "Nature of Man", Chapter 3, Marston Bates

E. A Sand County Almanac, Aldo Leopold

Films:

Animal War, Animal Peace (aggression, restraint in other species)
Cry of the Marsh

IV. Science-Technology

A. What Is Science?

B. What Is Technology?

1. Cybernetics
   a. As the tempo of change intensifies one finds it increasingly difficult to maintain traditional modes of life and patterns of thought.
   b. Is it possible that machine and man are or can exchange roles?
2. Automation

C. Interrelationship Between Science and Technology

1. Dependence of technology upon science
2. Legitimizing technological innovation.

D. Contemporary Problems in Science

1. Imposed secrecy
   a. military
   b. profit motive
   c. nationalism
   d. diminishing freedom to choose an area of study
2. Secrecy in science makes it difficult to erase the mistakes science has made.
3. Knowledge for knowledge' sake--good or bad?

E. Impact of Science and Technology on Human Values

1. Ability to adapt
2. Does man become non-humanistic?

3. All transitions involve degrees of suffering--what impact does this have on man?
4. What obligation(s) does society have to those of its members who are engulfed by the tide of technological progress?
5. Does technology rob man of exhilarating experiences?
6. Do machines cause men to prefer material things?
7. Do machines weaken men because of their dependence on them?
8. Will man's devotion to machines result ultimately in his total subservience to them?
9. Must there be a concomitant examination of man's moral standards and spiritual life?
10. Boredom
    a. Does man need a sense of fulfillment in creative group activities?
    b. Is creative satisfaction being denied because of technology?
    c. What do anonymously produced goods do for the workers who produced them?
    d. Does man need an atmosphere of adventure and expectancy?
    e. Does this type of exhilaration help man to free himself from the bondage to matter?
    f. Boredom is not easy to define or recognize; it often masquerades in the passive forms of entertainment, in dreary hours of aimless driving, in anonymous holidays which have lost their meaning.
    g. It seems as if the will to live--the eagerness to overcome the varied and inescapable problems of existence--is often weakened by physical comfort and wherever the cushion of government has been made too soft.
    h. What is the proper concept of work--it is the age of intellect, of brain; is brain "King" and machinery the "King's" prime minister?

F. Different Views of the Effects of Science and Technology on Human Values

1. Removes man from ignorance.
2. Man has submerged his true spiritual nature in order to gain material benefits and he will ultimately destroy himself.
3. Science must advance, but the technological change which it spawns must be subject to some kind of control in order that basic human values are preserved.

G. Science, Although a Part of Human Activity, Emphasizes the Explicit and Systematic.

1. This is very striking when we come to problems of right judgment and good conduct.
2. Science cannot exist without values--truth is a value.
3. Science itself depends for its life on the prior acceptance of certain fundamental values, such as the value of curiosity and learning, the value of truth, the value of respect for facts.

4. As science rests on certain values, so do almost all values depend on knowledge, and thus to some extent on science.
5. This implies a circular chain of causation or a feedback process, as do many processes of social and cultural development.
6. The duty to have good intentions is meaningless without the duty to try to know the facts and to try to foresee the consequences of one's deeds.
7. Thus, science needs values and values need knowledge.
8. What about timing--Einstein's principle of relativity or Chadwick's discovery of the neutron, or Hahn's work on uranium fission--if ten years later, no Hiroshima?
9. What is the use of a scientific discovery?
   a. Impossible to foretell the eventual good or evil
   b. Ben Franklin's analogy--"What is the use of a baby?"

H. Do Scientists Have an Obligation to Investigate All Possible Evils of Their Work?

1. Contemporary
2. Future generations
3. The choice of the balance point between benefits and risks is a value judgment; it is based on ideas of social good, on morality or religion--these cannot be dealt with using scientific processes.
   a. Level of tolerance is a social problem and must be resolved by social processes.
   b. We are going to have to tell scientists to stop doing some things.
   c. Harvard scientists who created something and then said: "gosh, should we have done it?"

Objectives:

A. Student can differentiate between what knowledge is scientific and what is not.

B. Student can comprehend the definition of science.

C. Student has the ability to relate science with technology.

D. Student can analyze the effects of the machine on man.

E. Student differentiates between mechanization and automation.

F. Student critically analyzes the views towards the impact of science-technology on human values.

G. Student develops the ability to control technology and science rather than allowing science and technology to control him.

Generalizations:

A. Control of environment is the result of technical and scientific knowledge being applied in a rational direction to achieve a particular objective.

B. There is no technological panacea for the problems related to the environmental crisis.

C. The basic solutions involve dramatic and rapid changes in human attitudes.

D. The innovation of a machine has an impact on the value system of man.

E. With the use of technology, a social cost is involved which at times may be greater than the benefits of technology.

F. Knowledge of the social structures, institutions, and culture of a society must be brought to bear on environmental considerations.

G. Technology helps determine the self-role perceived by an individual towards his environment.

H. Man is continually developing an ethical base for making value judgments.

I. Man performs some tasks at a high psychological cost.

Methodology:

A. Small group discussion questions:

1. Is pollution due to our emphasis on production and an expanding economy?
2. Should the profit motive be blamed for pollution?
3. Is pollution the result of an unlimited desire for consumer goods?
4. Are advances in technology the main cause of pollution?
5. Should scientists and engineers who focus on how we do something rather than why we do it, be held accountable for pollution?
6. Have our different levels of government ignored the perils of pollution?
7. Are all of us responsible for the dangers of the environment?
8. Why will it be so expensive to clean up the environment?
9. Why is Congress dragging its heels on passing anti-pollution bills?

B. Read the following:

1. Progressive Magazine, p. 12-18.
2. Man's Way, Chapters 4 and 5.

3. Reason Awake, Chapter 4
4. No Deposit, No Return, p. 261-264
5. Science and Survival, Chapter 1

C. Write a short paper on what the "New Technology" is and what effects it has had on you.

D. Group Projects

1. Investigate the major industries in your town and describe how science and technology, as well as automation are being used.
2. Report on the changes in the occupational structure of American society in the last half century.
3. Interview several industrialists in your area as well as union leaders concerning automation and compare their reactions.
4. Pick a social institution and present the consequences you expect on this institution as a result of increased technology.
5. Hold a panel discussion on "how technology has helped and hurt this high school."
6. Through role playing, develop a high school based on the increased technology you feel would be realistic in the year 2000.

Resources:

Films--Automania; Number 00073

Tapes--1. Technology and the Ethics of Glut
2. Scientists--on Top or On Tap?
3. Out Technological Society
4. The Machine Universe
5. Technology and the Ageless Conscious

V. Concerns Caused by Science-Technology

A. Environmental Threats to Man

1. Pesticides
   a. physical, chemical and biological properties
   b. significant effects on plant and animal species
      1) endocrine upsets
      2) nervous system
      3) effects on photosynthesis
      4) genetic effects
   c. alternative forms of pest control
      1) sterilization
      2) sex attractants

3) natural predators
4) pathogens
5) avoidance of monoculture
6) integrated control

2. Oil
   a. Major oil disasters
      1) Torrey Canyon incident
      2) Santa Barbara spill
      3) Alaskan pipeline controversy
   b. Repercussions
      1) wildlife
      2) recreation
      3) photosynthesis
      4) aesthetic
   c. Effects
      1) disrupt breeding
      2) reduce oxygen content and intake
      3) increase algal growth
   d. Sources
      1) bilge cleaning
      2) harbor spills
         a--disrupts spawning along continental shelf
         b--coastal waters where marine productivity is concentrated
   e. Clean-up
      1) pump into containers
      2) burning
         a--causes air pollution
      3) containing hasn't worked well
      4) detergents or dispersants sink oil where it does more damage
3. Chemicals
   a. Mercury
   b. Lead
   c. Mining and manufacturing acids
   d. Chlorine
   e. PCB/s (polychlorinated biphenyls)
   f. Nitrogen and phosphates
   g. Others
4. Depletion of natural resources
   a. Interactions between man and his resources
   b. Mineral resources
   c. Energy resources
   d. Water
   e. Soil
5. Landscape degredation
6. Overexploitation
   a. Fisheries and wildlife
   b. Land
   c. Water
   d. Forest
   e. Fossil fuels

7. Radiation
   a. History of nuclear development.
   b. If fusion power is ever tamed and if a way is found to safely dispose of its radioactive wastes, it will supply mankind with an inexhaustible source of electricity.
   c. The promise of atomic energy's future is clouded by its violent past.
   d. For a long time secret policies kept the public from understanding the radioactive "side effects" of nuclear explosions.
   e. The secret finally was exposed by the accidental dusting of 23 Japanese fishermen with radioactive debris from the March, 1954 H-bomb test at Bikini.
   f. Thermal effects of heat from neutrons.
   g. Is the complex fabric of our total civilization tied into an enormously powerful, lightly triggered and poorly understood war machine?
   h. Do we understand the hazards presented by the weapons of nuclear war?
   i. Alternatives and value changes necessary.
8. Drugs
   a. A look at the problem
   b. Types
      1) stimulants (amphetamines)
      2) depressants (barbituates)
      3) hallucinogens
      4) narcotics--heroin, opium
      5) marijuana
      6) alcohol
      7) tobacco
   c. Effects and side-effects of various drugs
      1) physical and/or psychological habituation
      2) reactions
         a--unpredictable
         b--recurrence
      3) loss of purpose, energy
      4) impaired judgment
   d. Reasons for use
   e. The social cost
   f. The ultimate question
   g. Core of existence
9. Mis-management of progress
   a. James Reston--"New Pessimism"
   b. The two natural containers of the environment, the air and the water, finally vomited back on Americans the filth they could no longer absorb.
   c. Progress is now used almost exclusively to denote changes in the "standard of living"--not the quality of life, but to the abundance of things--how many manufactured objects, not higher degree of education or better health.
   d. "Steady State" formula.

B. Air Pollution

1. Pollutants
   a. Carbon monoxide
   b. Sulfur oxides
   c. Nitrogen oxides
   d. Hydrocarbons
   e. Particulates
      1) effect on climate
      2) greenhouse effect
      3) trends
   f. SST
2. Effects of pollutants
   a. Property damage
   b. Crops
   c. Public health
   d. Tokyo
      1) police take oxygen breaks
      2) pedestrians get oxygen at vending machine
3. Major sources
   a. Internal combustion engine
   b. Other industry
   c. Agriculture
4. Smog
   a. Causes
   b. Types
      1) London type
      2) Los Angeles type
   c. Temperature inversions

C. Water Pollution
1. Striking examples
   a. Cuyahoga River
   b. Lake Erie
2. Pollutants
   a. Industrial wastes
      1) lead, mercury, chlorine
      2) mining and manufacturing acids
         a--strip mining
      3) oil
      4) radioactive wastes
      5) pesticides
   b. Municipal wastes
      1) garbage
      2) sewage
      3) eutrophication
         a--"build canoes with wheels on"
      4) detergents
         a--biodegradable
         b--phosphate content

c. Agricultural wastes
   1) fertilizers
      a--agriclutural-nitrogen-phosphorus-washoff
      b--nitrogen from automobiles
   2) silt washoff
   3) pesticides
      a--tremendous number of fish that cannot be sold on the open market

3. Effects
   a. Eutrophication (successive enrichment and suffocation of a lake)
   b. Loss of recreational facilities
   c. Reduce photosynthesis in phytoplankton
   d. Aesthetic pollution
   e. Effects on wildlife
   f. Economic loss due to lowered productivity of species

D. Solid Waste Pollution

1. Types
2. Quantity
3. Effects
4. Types of sewage treatment
   a. Primary
   b. Secondary
   c. Tertiary
5. Recycling

E. Thermal Pollution

1. Definition
2. Sources
3. Effects
4. Alternatives

F. Noise Pollution

1. Meaning
2. Types
   a. Airplane
   b. Factory
   c. Home
3. Stimuli affecting man
4. Effects
   a. Steady intense noise can inflict irreversible damage.
   b. Sounds not sufficiently loud to awaken sleeping people nevertheless affect their brain waves.
   c. People may learn to tolerate the supersonic boom, but the chances are very great that this adjustment will be achieved at the cost of physiological and mental damage.
   d. Sociological knowledge shows that the man-hour loss of time by persons experiencing the boom and recovering from its effects far exceeds the man-hour saving of time by persons flying at supersonic speed.

5. Much noise seems amenable to technological solutions.
6. Values and opportunity costs.

G. Aesthetic Pollution

Objectives:

A. Student becomes aware of the scientific innovations that have developed in the world.

B. Student can differentiate between the benefits and risks of each innovation.

C. Student develops attitudes that will encourage him to view innovation from a long range view as well as the immediate benefit.

D. Student can objectively weigh the alternatives available in the attempt to erase the negative ramifications of certain innovations.

E. Student uses discretion in how he attempts to control the environment.

Generalizations:

A. There are certain risks taken, and limitations experienced, when manipulating the natural environment.

B. Resource depletion can be slowed by the development and adoption of alternatives.

C. Multiple use is a practice in which a given land area functions in two or more compatible ways.

D. Safe waste disposal, including the reduction of harmful and cumulative effects of various solids, liquids, gases, radioactive wastes and heat, is important if the well being of man and the environment is to be preserved.

E. Pollutants and contaminants are produced by natural and man-made processes.

F. Increasing human populations, rising levels of living and the resultant demands for greater industrial and agricultural productivity promotes increasing environmental contamination.

G. Natural resources are interedependent and the use or misuse of one will affect others.

H. Water supplies, both in quantity and quality are important to all levels of living.

I. The earth and life on it are greatly affected by the atmosphere.

J. Water is a reusable and transient resource, but the available quantity may be reduced or quality impaired.

K. Soil is classified as a renewable resource, yet it may take a few years to thousands of years to be "renewed", so it should more practically be termed a depletable resource.

L. The alternatives to war and war weapons must be considered if society is to survive.

M. Conflicts emerge between private land use rights and the maintenance of environmental quality for the general public.

N. Individuals tend to select short term economic gains, often at the expense of greater long term environmental benefits.

Methodology:

A. Pick one area of concern that deals with the environment and develop the scientific evidence showing its harmful effects. With this information, present what alternatives or methods you would use to help remedy the situation.

B. Panels to present to class on these areas:
   1. Air Pollution
   2. Water Pollution
   3. Solid Waste Pollution

C. Debate the pros and cons of the following controversial projects:
   1. Alaskan Pipeline
   2. SST
   3. Project Sanguine

D. Read about the major oil spills (Santa Barbara, Torrey Canyon, etc.) and report to the class on their repercussions.

E. Research the area of recycling; write a paper on its desirability, methods used, and results.

F. Debate: "Negative consumption should or should not be a prime responsibility of all Americans."

G. Invite a physician to discuss the medical truth about drugs.

H. Debate: "Marijuana should or should not be legalized."

I. List ten reasons for use of drugs in order of their importance in today's society.

J. Class trip to sewage treatment plant and sanitary landfill site.

Culminating Activity:

A. Write a story on "Spaceship Earth", as defined by Adlai Stevenson, in which you interject what is needed and what must be watched out for on the "Fragile Craft".

B. Investigate and take action against pollution your school responsible for or contributes to. Does your school release too much black smoke? (Check city ordinances.) Does it use metal or aluminum cans in pop machines? What is done with the trash from school? Do school buses have adequate anti-pollution devices? Do many people who could walk to school take rides?

C. Read the following:
   1. The Environmental Handbook, Garrett De Bell.
   2. No Deposit, No Return, p. 66-67.

Evaluation:

A. Objective examination on scientific basis for innovations discussed.

B. Subjective examination on the value judgments needed to resolve an area of detrimental influence on the environment.

C. Evaluation of papers and presentations to class in form of panels and debates.

Resources:

A. Films

   1. Air Pollution: Take a Deep Deadly Breath
   2. Noise: The New Pollutant
   3. Bulldozed America
   4. The Problem with Water Is People (implications of polluted water)
   5. The Third Pollution (solid waste)
   6. Poisons, Pests, and People (effects of pesticides, alternatives)
   7. Progress, Pork Barrel and Pheasant Feathers (Everglades sacrificed to progress and politics)

B. Tapes

   1. To Hell with Posterity

C. Readings

   1. Life Education Reprints
      a. "Air Pollution"
      b. "Water Pollution--the Blighted Great Lakes"
      c. "LSD Spells Danger"

2. Progressive Magazine, April 1970
3. "Pesticide to Pest", Time, July 1969
4. "Pesticide Pollution", Clarence Cottam, National Parks Magazine, November 1969
5. "Food and Famine", New York Times Student Weekly, April 6, 1970
6. "Environment--What Can Be Done?", Life Ed. Reprint

D. Simulation Games

1. Smog
2. Dirty Water
3. Pollution
4. Planet Management Game
5. Redwood Controversy
6. Balance

E. Filmstrips and Records or Cassettes

1. Pollution
2. Pesticides
3. Interrelationships of Pollution, Sewage, Fertilizers
4. Interrelationships of Pollution, Insecticides, and Automobiles
5. Drugs--The Dream vs. The Reality

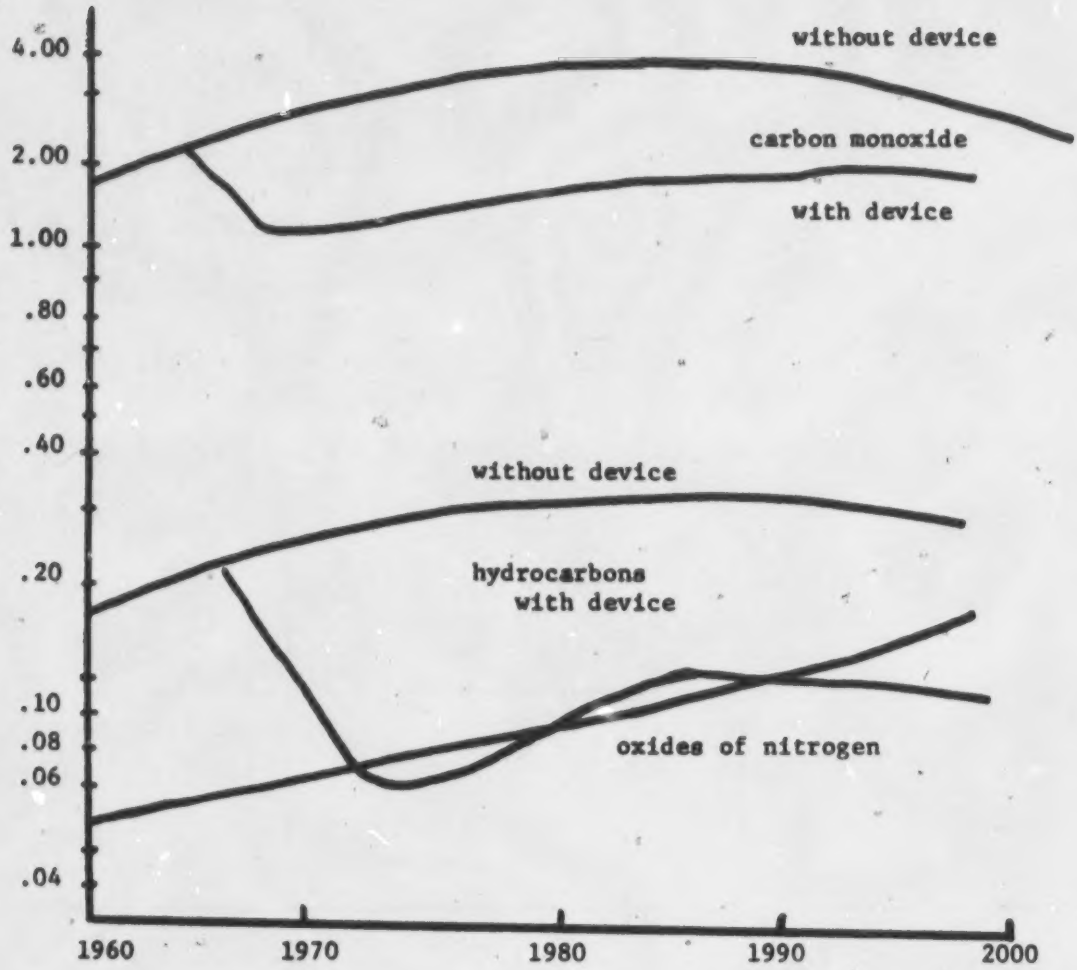
VI. Population

A. Population Explosion--Fact or Fiction

1. Environmentalists
2. Minority groups
3. Poor
4. Business and industry
5. Lower, middle, and upper classes

B. Population Growth

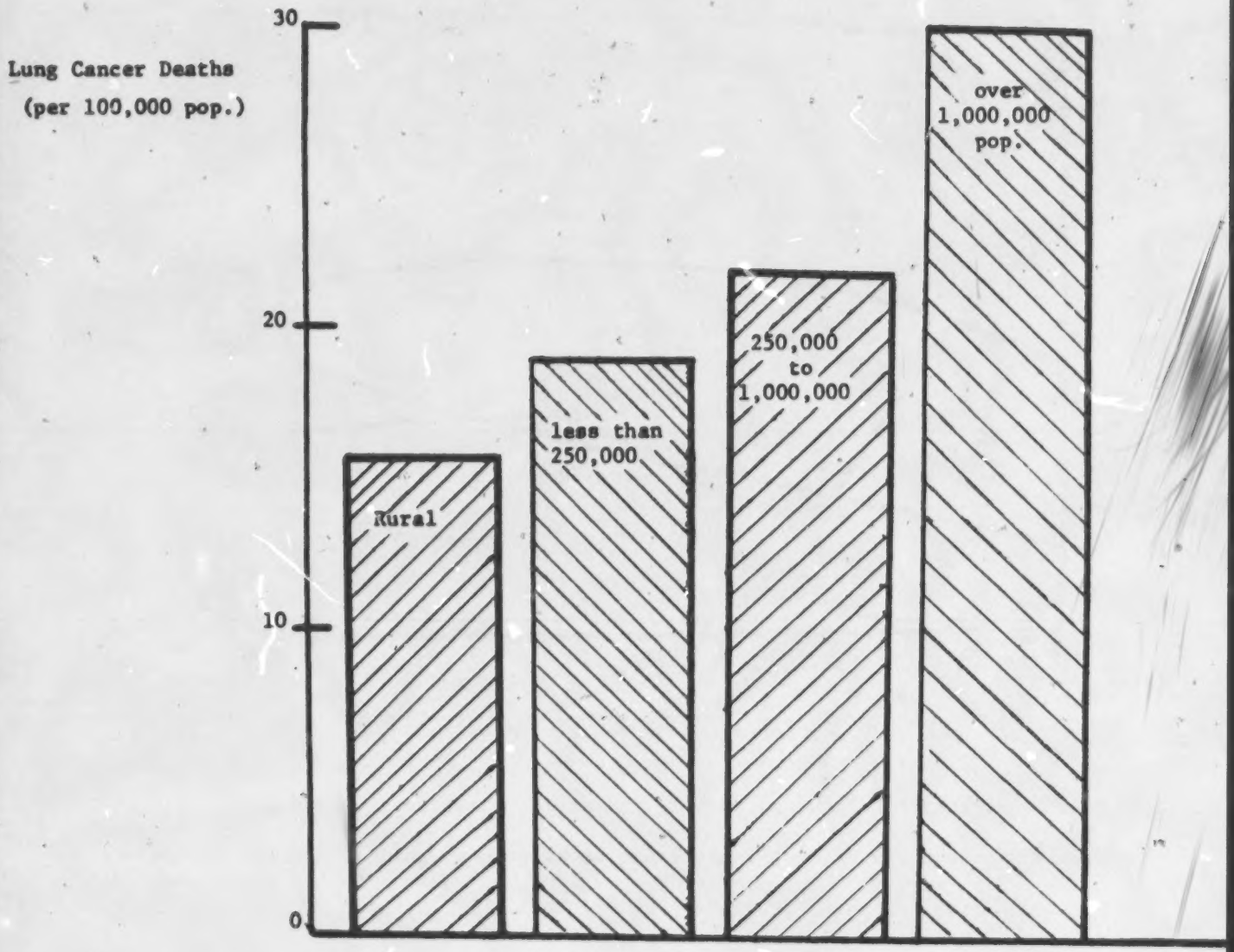
1. History of population growth
   a. Malthusian theory
   b. Birth rates and death rates
2. Current trends
   a. World
      1) developed
      2) underdeveloped
   b. United States
      1) differential birth rate
         a--education
         b--income
         c--race
         d--religion
         e--age group
         f--possible functions of sex in the above groups
      2) death delaying attitudes



Annual Motor Vehicle Emission

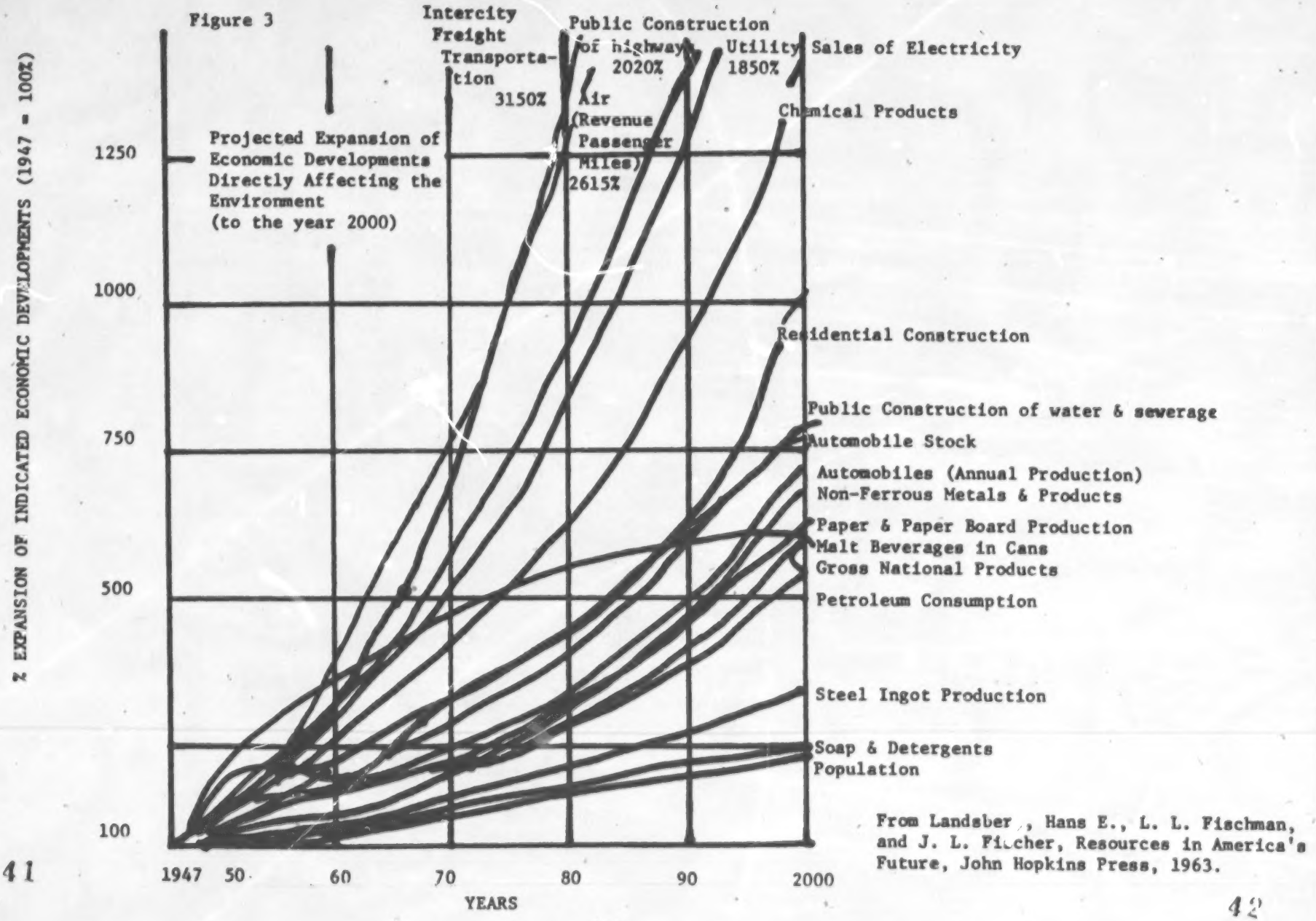
Why is it essential for the automobile industry to develop new devices to filter exhausts? Should the production of vehicles be stopped until these safeguards are perfected? Give reasons to support your opinions.

Bigger Cities
More Air Pollution
More Deaths



From this graph, what effect does density of population have on lung cancer? Why?
From the line graph, what is the percent rise in emphysema deaths from 1950 to 1964?
What does this tell you about air pollution?

Figure 3



From Landsber , Hans E., L. L. Fischman, and J. L. Fischer, Resources in America's Future, John Hopkins Press, 1963.

3. Natural regulators
   a. Food supply (famine)
   b. Disease (pestilence)
   c. Predators (war?)
4. Limits of the Earth
   a. Space
   b. Energy
   c. Non-renewable mineral resources
   d. Water
   e. Food
5. Food vs. famine
   a. Nutrition and hunger
      1) picture in America
      2) world scene
      3) deficiency diseases
   b. Possibilities for increasing world-wide food production
      1) improving yields on land
      2) reduction of food losses
      3) food from the sea
      4) novel sources of food
      5) ecological consequences of the above measures
      6) the prognosis
6. Population density
   a. Social pathology in other animals
      1) John Calhoun's experiments with rats
      2) James Island deer population
   b. Degrees of social deviancy
      1) contra-culture
      2) counter-culture
   c. Physiological effects of overcrowding on people
   d. Social heirarchy
   e. Asocial behavior
      1) input overload
      2) escape mechanisms
   f. Adaptability of man
      1) Kessler phenomenon
      2) rate of population increase

C. Possible Solutions

1. Zero population growth
2. Negative growth rate
3. Eugenics
4. Contraception
5. Abortion
6. Sterilization
7. Changing life styles--"the good life"
8. Government intervention
   a. tax incentives
   b. legal limits to family size
   c. financial remuneration
   d. social pressure
   e. delayed marriage and childbearing

D. Optimum Population

1. Carrying-capacity of the Earth
2. Economic considerations
3. Psychological considerations
4. Moral and ethical considerations
5. Social considerations
   a. Role of children
   b. Interpersonal relationships
      1) person-to-person
      2) family-neighborhood-community

Objectives:

A. Student can objectively investigate the relationship of numbers of people and environment.

B. Student comprehends the present trends in population throughout the world.

C. Student can analyze the possible alternatives available in the area of quantity and quality of population.

D. Student recognizes the ramifications of various population densities.

E. Student is cognizant of the consequences of differing population growth rates.

Generalizations:

A. Man's need for food, fiber and minerals increases as populations expand and levels of consumption rise.

B. Management is the result of technical and scientific knowledge being applied in a rational direction through the use of values.

C. Increased population mobility is changing the nature of the demands on some resources.

D. Options available to future generations must not be foreclosed.

E. The economy of a region depends on the utilization of its natural, human, and cultural resources and technologies over a period of time.

F. The distribution or location of resources in relation to population is critical to problems of resource conservation and use.

G. The political and economic strength of a country is in part, dependent upon its access to domestic and foreign resources.

H. Conservation policy is determined by the interaction of science and technology; social and political factors, and aesthetic, ethical, and economic considerations.

I. Increasing population and per capita use of resources have brought changed land to man or resource to population ratios.

J. The interaction of environmental and biological factors determine the size and range of species and populations.

K. Natural resources, water and minerals in particular, are unequally distributed with respect to land areas and political boundaries.

L. Natural resources are affected by philosophy, religion, government, and the arts.

M. A significant number of people become asocial rather than antisocial as a result of overcrowdedness.

N. As populations increase, competition for the use of water increases resulting in a need for establishing water use priorities.

O. In a democracy, a basic theory is that increasing restrictions on resource allocation and use are imposed by the consent or insistence of the people.

P. Human resources include the physical and mental abilities with which man is endowed and the knowledge he can generate.

Q. Family planning and the limiting of family size are important if over-population is to be avoided and a reasonable standard of living assured for successive generations.

R. Population growth increases the probability of a lethal world wide plague; each of which is potentially capable of destroying civilization and even of driving Homo Sapiens to extinction.

S. The rapidity of increased population density can influence the degree of social pathology.

T. An individual's attitudes towards population quantity and population control are largely dependent on one's desired life style.

Methodology:

A. Read the Population Bomb and write your reaction to the eleven inalienable rights developed by Dr. Ehrlich.

B. Participate in role-playing exercise ("Ability to Empathize", on the following page).

C. Debate: "Birth Control [is] [is not] a form of murder."

D. Debate: "A negative birth rate or a zero population growth [are] [are not] morally acceptable."

E. Invite a physician to talk on the legal rights of an unborn child.

F. Invite an attorney to talk on the legal rights of an unborn child.

G. Invite a Catholic clergyman, a protestant clergyman and a Jewish Rabbi to present their views on population control.

H. Chapter 1 in Terracide, "Life in a Crowd"--interpretive reading by student for class.

I. Suggested readings:
1. Our Crowded Planet, Fairfield Osborn
2. The Problem of Population, George Shuster
3. The Prevalence of People, Marston Baten
4. Our Overcrowded Planet, Tadd Fisher
5. Scientific American, August 1964, "Population Control in Animals"
6. Scientific American, February 1962, "Population Density and Social Pathology"
7. Scientific American, September 1963, "Population"
8. Life, January 9, 1970, "Problem of People Pollution"
9. Natural History, January 1970, "The Proliferation of the Species"
10. New Republic, October 25, 1969, "Feeding the Hungry"
11. Life, January 9, 1970, "Squeezing into the 70's"
12. Life Reprint Series, "Cities for Tomorrow"
13. Limits to Growth, Meadows, MIT

J. Required reading:
1. No Deposit, No Return, p. 35-44
2. So Human an Animal, p. 153-160
3. Reason Awake, p. 188-191

K. Small group discussion questions.

L. Discussion questions--be able to react to the following:
1. Why might over-population lead to revolutionary activity or political unrest?
2. Will the "green revolution" provide enough food to take care of world population growth?
3. Have the advancements of medical science been a true blessing to the world?
4. Is there an answer to population growth problems in space exploration?
5. Who should decide how many children a family may have?
6. Would you agree to a legal prevention on having more than a fixed number of your own children?
7. Is the population explosion responsible for environmental pollution?

ABILITY TO EMPATHIZE

The ability to empathize, to see a problem from another person's vantage point, is a skill that must be widely developed and practiced if national problems, like conflict over abortion laws, are ever to be solved.

Consider the following proposals by Senator Robert W. Packwood of Oregon:

My proposal is strictly voluntary. If a woman chooses not to use a contraceptive device, that is her business. But the government has a responsibility to make birth control information available to all women. If the woman then chooses to use a device to prevent pregnancy, the government should make certain that she has access to such a device. If she cannot afford to pay for it, the government should provide it free of charge.

The second voluntary step is to allow any woman in any state to have an abortion if she chooses.

A third step which must be implemented is a government policy of encouraging smaller families through a tax incentive program. One way this can be done is by limiting the number of children which can be declared as income tax deductions.

Try to imagine how the following individuals might react to each of Senator Packwood's three proposals.

A liberal Roman Catholic wife
An atheist
A Lutheran minister
A congressman who representa a large urban area
A presidential candidate
The president of Gerber Products (baby foods)
The president of a toy manufacturing company
A businessman in Sweden
A women's liberation activist
A black militant
An eighteen year old "Hippie"

SMALL GROUP DISCUSSION QUESTIONS: POPULATION

1. If you are 40 or less, you can expect to live to the end of this century when there should be between 2 billion and 3 billion more people in the world than there are today. What effects, if any, do you anticipate this will have on your family's life 28 years from now?

2. In your opinion, is population increase (a) a problem that every country needs to deal with; or (b) a problem mainly for the poorer countries with high birth rates? Why?

3. Do you believe that man is inevitably the enemy of his environment--meaning that as his numbers (and his standard of living) increase, so must the degree of pollution, resource depletion and ecological damage throughout the world? Why or why not?

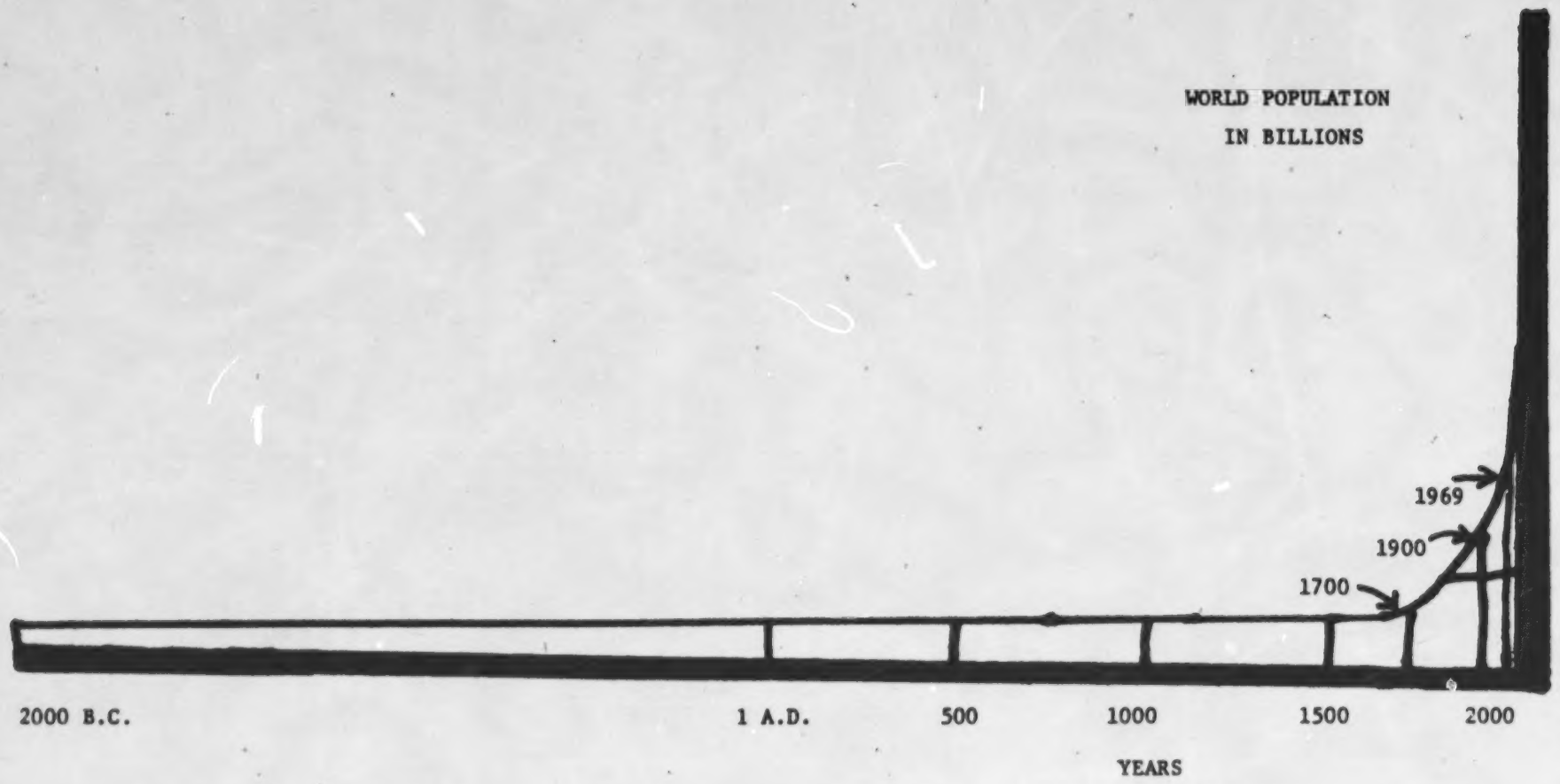
4. One expert, citing the huge death toll in East Pakistan from the cyclone of November 1970, warns that the population crisis may be solved by the traditional "natural" mechanism of intermittent catastrophe: as human density grows, "the scale of human disaster will grow commensurately". Do you think this more or less likely to curb overpopulation than the various methods of birth control?

5. What parental motivations account for the number of children in a family? Do you feel the number of two children is "ideal" both in terms of a family's interest and society's? Why or why not?

6. U.S. government aid to population activities in the LDC's is now provided only when requested to support programs originating in the host countries; and American foreign aid is never made conditional on population control efforts by the recipients. Do you agree or disagree with this "voluntary" approach? In what ways do you think our contribution could be improved?

7. In countries with fast-growing populations, what specific measures do you feel their own governments could take to discourage parents from wanting more than two or three children? What obstacles (administrative, financial, cultural, technical) might be encountered in the promotion of such "anti-natalist" programs?

8. Do you favor family planning as the best way of curbing population growth? Would you recommend the use of coercive methods to curb population increase in countries with fast-growing populations? Would you approve or disapprove of the legalization of abortion to curb population growth? Why?


WORLD POPULATION
IN BILLIONS
1969
1900
1700
2000 B.C.
1 A.D.
500
1000
1500
2000
YEARS

M. Debate between the pessimists or "prophets of doom" and the optimists who believe that the green revolution will save mankind.

Resources:

A. Filmstrips and cassette tapes or records:
   1. "Population Statistics"
   2. "Population Trends"
   3. "Population Explosion"--crisis of the Environment

B. Films:
   1. Multiply and Subdue the Earth (Indiana AV Center)
   2. Standing Room Only (McGraw-Hill)

VII. The Role of the Scientist, Citizen, Industrialist, and Administrator

A. Few persons are completely unaware of the dangers experienced by man in the technological world, but on the whole, the public does not appear to be greatly alarmed about them.

B. We tend to ignore progressive changes, until they reach catastrophic dimensions--we have come to tolerate air pollution, foul water, crowding, garbage, noise and confusion in the streets.

C. It is easy to blame pollution only on the large economic interests, but pollution is a by-product of our consumption-oriented society. Each of us must bear his share of the blame.

D. It we want air we can breathe and water we can drink, we must ask ourselves if the extra comfort of the latest technological whim is worth the environmental price.

E. The decision making process weighing hazard and benefit must be resolved in the arena of public policy.

F. If scientists created the problem, they must be involved in the solution.

   1. Did they create the problems?
   2. Twice in this century American scientists have become involved in great national projects: the atom bomb and the Apollo projects. Following each, there have been long periods of afterthought, second thoughts, and doubt.
   3. In the purely scientific view the concepts of success and failure are hard to define. They rely on value systems built around beliefs, assumptions and self-evident truths.
   4. Scientists dominated the Manhattan Project--engineers, politicians, military men, and large corporations dominate the Apollo Project.

G. If the issues require social, political, and moral judgments, they must reflect demands, opinions, and ethics of citizens.

H. Should a scientist cling to the objectivity of the laboratory and try to keep political views separate from scientific duties?

1. Since World II scientists have become very conscious of this question.
2. Do scientists have a particular moral responsibility to counter the evil consequences of their work?
   a. What about their ability for rational thought which renders them to some degree detached from the emotions that encumber the ordinary citizen?
   b. What if two protagonists claim to know as scientists through the merits of the methods of science, the first that nuclear testing is essential to the national interests, the other that it is destructive of the national interests. Where lies the truth?
3. The citizen has begun to doubt what he used to take for granted--that the achievements of scientists are necessarily good for society.
   a. If scientists attach to their scientific conclusions those political views or social judgments which happen to provide support for these conclusions, scientific objectivity comes under a cloud.
   b. Those in a democratic society who have the duty to make the decisions--legislators, government officals, and citizens generally--are often unable to perceive the issues behind the enveloping cloud of science and technology. And if those who have the special knowledge to comprehend the issues--the scientists--claim for themselves a major voice in the decisions, they are likely to aggravate the very threats to the integrity of science which have helped to generate the problems in the first place.

I. The Production of an Informed Citizenry

1. Scientists are just custodians of scientific knowledge. Knowledge must be relayed to citizens in order for intelligent decisions to develop.
2. Margaret Mead: "Scientists' efforts to alert citizens to issues is a new social invention."
3. But does it work?
   a. Scientists have no control over news media or the machinery of government; cannot overcome the governmental self-justification and journalistic inertia which so often impedes public knowledge about complex, confused public affairs.
4. But why all the fuss over environment today?
   a. Diversionary tactic?
   b. Are people sincerely concerned about environment--why or why not?
   c. Can we allow a substantial amount of our society to "park on somebody else's nickel"?

J. Attempts to Help

1. Educational institutions
   a. science in the school
   b. countervaling forces
2. Mass media
   a. motives of the mass media
   b. opportunities to consider
   c. government increased activity in mass media
3. Governmental agencies
   a. linear "mission" orientated role of most government services
   b. structure of con-ressional "system"
      1) policy review as a function of Congress
      2) how one becomes a congressman--example of oil industry and electric cars
   c. legislation and achievements
      1) local community
      2) county
      3) state
      4) federal
4. Professional organizations
5. Associations of interested individuals
6. Industry's contribution

Objectives:

A. Students critically analyze the various positions scientists, citizens and government administrators can take towards their roles in the arena of environment.

B. Students become aware of the conflicting pressures and limitations facing each group.

C. Students develop a value system of their own in which they become active participants in making the environment a viable one.

Generalizations:

A. The management of natural resources to meet the needs of successive generations demands long-range planning.

B. Individual citizens should be stimulated to become well informed about resource issues, problems, management procedures, and ecological principles.

C. Conservation responsibilities should be shared by individuals, businesses and industries, special interest groups, and all levels of government and education.

D. Man has moral responsibility for his environmental decisions.

E. Knowledge of the social structures, institutions, and culture of a society must be brought to bear on environmental considerations.

F. The relationship between man and the natural environment are mediated by his culture.

G. Social values and morals influence personal conservation behavior.

H. Public opinion constitutes a control over the use of conservation practices.

I. In a democracy, a basic theory is that increasing restrictions on resource allocation and use are imposed by the consent or insistence of the people.

J. Individual citizens should be stimulated to become active in the political process.

K. We have "legal" ownership of some resources like real estate and control over others during our lifetime, but ethically we are "stewards" rather than owners of the resource base.

L. Policies, including natural resource policies, came about as the result of interacting social processes: science and technology, government operations, private interests, and public attitudes.

M. An individual must develop his ability to perceive if he is to increase his awareness and develop environmental perspective.

N. Individuals perceive different self-roles depending upon their position in the social and environmental context.

O. Man has the capability of improving society through sociology, psychology and science.

P. Man is continually developing an ethical base for making value judgments.

Q. A knowledge of the social, physical, and biological sciences and humanities is important for environmental understanding.

R. Architecture can be one of the positively persuasive influences in developing a congenial environment.

S. A sound natural resource policy is dependent upon a flexible political system, pragmatically appraising and re-appraising policies and programs in terms of their effect upon the public interest and in light of scientific knowledge about the natural resources.

Methodology:

A. Read Progressive Magazine, p. 63-66.

B. Read chapters 6 and 7 in Commoner's Science and Survival.

C. Develop a panel discussion by a U.S. senator, state legislator, mayor and a city councilman on how they view ecological problems.

D. React to the following proposed amendment to the United States Constitution:
   1. Every person has an inalienable right to a clean, healthful, and decent environment.
   2. Any citizen adversely affected by the environmental activity of any other person or agency, public or private, shall be entitled to redress in an appropriate state court, Article VI of the Constitution to the contrary not withstanding.
   3. Any person or agency, public or private, using or exploiting common environmental resources shall, if it is substantially challenged in a civil proceeding that his activities will upset the natural ecological balance, be required to demonstrate affirmatively that his action will not redound to the detriment of the public or generations yet unborn.
   4. Every state shall have power to place higher standards of regulation upon the use of common environmental resources than those that may have been provided by federal law, Article VI of the Constitution to the contrary notwithstanding.
   5. The Congress shall pass laws or taxes as are necessary to preserve or restore the environment from contamination or degradation by chemical, biological, radiological, thermal, or other pollution. In addition, the Congress shall undertake to acquire and preserve open land, wilderness spaces, and scenic areas.

E. Interview a corporation executive, a manual worker, a government official. Compare and contrast their views towards environment as well as their suggested means for solving any problems they feel exist.

F. Have a speaker from a news media present views on the obligations of the media, if any, to help with the ecological problem.

G. Discuss:
   1. Can technology cure or control the problems created by pollution?
   2. How can production methods be changed to prevent pollution?
   3. How can consumption patterns be changed to help control pollution?
   4. What economic problems does pollution produce?
      a. How can a market economy absorb the costs of pollution?
      b. Should industry be required to pay for the lion's share?
      c. Should tax incentives be sufficient for private enterprise to alter production methods for pollution abatement?

d. How much will consumers have to pay in higher prices and higher taxes for pollution safeguards?
e. Will the consumer and taxpayer be willing to pay?
f. Is industry the major villain in the pollution story?
g. Is the concept of "free goods" obsolete?
h. Is pollution a public or private responsibility?

H. Read and be able to discuss the AEP pamphlet, "Science and Public Policy".

I. Sponsor a talk by an industrial executive on the attempts of industry to help.

J. Read the following pages from No Deposit, No Return: 172-175, 179-189, 198-203, 230-233, 238-241, 251-256.

K. Small group discussion questions:
1. Why will it be so expensive to clean up the environment?
2. Why is Congress dragging its heels on passing anti-pollution bills?
3. Do ecologists agree on what should be done to save our environment?
4. Can our economic system be preserved if we solve our pollution problems?
5. Must we stop viewing water and air as free commodities to solve our environmental problems?
6. Will consumer goods have to be limited to solve our environmental problems?
7. Can anti-pollution be profitable?
8. Will industries have to be nationalized to solve our economic problems?
9. Do socialist countries have pollution problems?
10. Should violation of anti-pollution laws be a criminal offense?
11. Will solution of problems of the environment require greater centralization of the government?
12. Should one group pay most of the cost of anti-pollution control?
13. Will the consumer ultimately have to pay for anti-pollution measures?

L. For class discussion:
1. Moratorium on technological development or use of technologies to help solve the problems technologies produce.
2. Impact of technology from the accumulated effects of technological changes underway for some time.
   a. population explosion and medical technology
   b. automobile and urban crisis
   c. disruption of ecological systems by the wholesale application of pesticides and fungicides
3. Time lag between recognition of a problem and the development of solutions.
4. Value conflicts between generations due to rapidity of change.
5. Increasing gap between the developed nations and have-not nations.
6. Alienation from traditional values.
7. What happens to the sense of self in the world of giant and pervasive man-made events? The feeling of helplessness and powerlessness when surrounded by pollution, radiation, megalopolis, etc.

8. Increased leisure--a way for man to find or lose himself?
9. Role of churches in an increasingly rationalized and technological society.
10. Development of ways to assign priorities and revise costly efforts without institutional disruption.
11. The new technology--a challenge to the adequacy of the traditional disciplines for dealing with the kind of world they have helped create.

Resources:

A. Life Reprint Series--"Environment: What Can Be Done?"

B. Film--Science and Foresight (heaven and hell of our technology)

C. Tapes:
   1. "The Earth Savers"
   2. "Progress Means Pollution"
   3. "Earth Killers"
   4. "Politics of Ecology"

TAPES FOR COURSE "ECOLOGY AND HUMAN VALUES"

Survival--A low-keyed but emotional report by Eddie Albert, actor and conservationist, of the tragic effects he has himself witnessed of our indiscriminate violation of nature. Describing the perils of pollution, Mr. Albert underscores our last chance for turning the danger signals into opportunities for survival. (27:01)

The Earth Killers--Physicists can blow up the world; bacteriologists can destroy it by disease; pollution can suffocate it; and a population explosion can starve it to death. Science must come under public control while time still remains. (28:20)

The Earth Savers--Ecology has replaced motherhood as the all-embracing issue for radicals and conservatives and politicians of all persuasions. Yet the volume of words spoken is nowhere matched by dollars allocated to save the environment. Only the electorate, by moving government onward, can save the earth. (28:58)

Progress Means Pollution--The price of an industrial society is pollution. Immediate attention to these thermo-generated problems is urgent if we are to keep our high standard of living from becoming a high standard of dying. Discusses possible solutions: legislative, judicial, and political. (40:26)

To Hell with Posterity--"Hell is a city much like London, a populous and smoky city." Today, science and technology seem hell-bent on creating bigger and smokier cities, on defiling the waters with waste products; on indulging in atom-foolery until we all become victims of slow but insidious smothering and radiation. Makes a case for the need to apply social responsibility to scientific discovery instead of racing pell-mell to a finish line that may spell the end of civilization as we know it. (29:13)

The Politics of Ecology--The now deceased Aldous Huxley says the most pressing problems facing democracy in the next ten years are the population explosion, the arms race, and rising nationalism. He suggests that a shift in our attention from bad politics to enlightened ecological understanding may help prevent war. (44:00)

Technology and the Ethics of Glut--The discussants here clarify the real complexities behind the glib assertion that man can and should control his population and products, but they find little agreement beyond clarification. "There is no such thing as uncontrolled technology...poor dark people see contraceptives as a weapon against them." (51:11)

Center for Democratic Institutions
Santa Barbara, California

SUGGESTED ECOLOGY PROJECTS

1. Make your own film or slide presentation accompanied by an audio portion.
2. Write and perform an ecology skit.
3. Write ecology songs or make a collection of environmental songs explaining the message of each song.
4. Make a series of posters depicting ecology or environmental problems.
5. Make a photographic display dealing with some aspect of ecology or values.
6. Make sculptures from trash or waste products.
7. Design and construct a model of a building using discarded materials (used lumber, cans, bottles, paper, etc.).
8. Conduct a survey:
   a. on attitudes toward abortion, birth control, etc.
   b. on national priorities in different schools or communities.
   c. to compare and contrast values of people over 60 with those under 21.
   d. To find out what's being done in several local communities in combatting environmental problems.
9. Write an analysis of the effects of mass media advertising on the thinking and behavior of people.
10. Develop a literary publication on values and/or environment.
11. Draw and/or paint a picture illustrating values and/or ecological problems.
12. Determine the values of the citizens in your community toward the environment.
13. Investigate what is being done at the state and federal level regarding pollution abatement.
14. Produce a series of sketches illustrating human values or environmental problems with captions under each.
15. Write a documented research paper on:
   a. types and rapidity of change in the United States.
   b. noise pollution.
   c. Project Sanguine--pros and cons.
   d. effects of size, shapes, interiors and exteriors of buildings on the behavior of people.
   e. whys of drug abuse.
   f. drug abuse--a medical or criminal problem?
   g. alternative solutions to the drug problem.
   h. effects of increased population density on humans--physiologically and psychologically.
   i. various alternative means of transportation--pros and cons of each.
   j. how to restore the balance between human population and the natural environment of this planet.
   k. reasons people want children and how they determine what is "optimum" for their family.
   l. man--master or servant of technology?
   m. impact of television and automobile on man's lifestyle.
   n. analysis of how contemporary man attempts to solve his value conflicts.
16. Read and write a critical review of at least two of the following books:
   Nature of Man:
   <u>Man's Way</u>
   <u>Reason Awake</u>

Human Zoo
Naked Ape
Territorial Imperative
So Human an Animal

Concerns of Science-Technology:
Moment in the Sun
The House We Live In
The Ecological Crisis--Readings for Survival
No Deposit, No Return
Terracide
Global Ecology--Readings Toward a Rational Strategy for Man
The Frail Ocean
Silent Spring, Since Silent Spring
SST and the Sonic Boom
Our Polluted World
Environment, Editors of Fortune

Population:
The Prevalence of People
Our Overcrowded Planet

Roles:
Politics of Pollution

17. Investigate and analyze view toward environment and ecological problems of several other nations.
18. Develop and implement in class a simulation project dealing with either values or an environmental problem.
19. Analyze consumption patterns of Americans by observing what they throw away.
20. Listen to and write a review of at least 4 of the following tapes:
    Suicide is a Felony--What About Smog?
    Stumbling Blocks to Social Planning
    Where Have All the Cuckoos Gone?
    Scientists: On Top or On Tap?
    Earth Savers
    Technology and the Ethics of Glut
    To Hell with Posterity
    Politics of Ecology
    Survival
    Progress Means Pollution
    Earth Killers
21. Collect and chemically analyze various contaminants of the air and water in your local community.
22. Visit various waste disposal operations and write a paper discussing the different types of disposal and their effectiveness.

NOTE: Any student may submit an alternative proposal for approval. All papers must be documented.

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